

URBAN WATER SUPPLY IN THE 21st CENTURY

NANCHANG MUNICIPAL GOVERNMENT

Nanchang is the political, economic, cultural, scientific, technological, and information center of Jiangxi province. A famous historical and cultural city, it is one of the cities along the Yangtze River Economic Development Belt in the eastern People's Republic of China (PRC). The center city covers 89 km²; in 2010, the built-up urban area will be 130 km². The population of the city center is 1.37 million; it is expected to be 1.75 million in 2010.

Located in north central Jiangxi province, on the lower reaches of the Ganjiang River and the Poyang Lake, Nanchang is strategically located along a key intersection of the Yangtze River. Mount Xi towers over its western suburbs, where peaks and valleys are luxuriant with trees and bamboo. The Ganjiang River runs through the city, dividing it into south and north. The eastern area is flat, and the site of Qingshan and Aixi Lakes. The East, West, South, and North Lakes lie in the city center like four bright mirrors. Surrounded by rivers and dotted with lakes, the beautiful city enjoys a subtropical climate—mild and humid—with abundant sunshine, sufficient rainfall, and a long frost-free period.



Originally built during the Western Han dynasty, Nanchang has a 22-century-long history. It is also the birthplace of the People's Liberation Army and the site of the 1 August Nanchang Uprising. So far, 104 historical sites have been designated as preservation sites—5 at the Government level and 20 at the provincial level. Nanchang is both a modern city as well as a beautiful historical and cultural center.

It is also a transportation hub. The Beijing-Kowloon railway, Zhejiang-Jiangxi railway, and three national highways all cross the city. The newly built airport links the city with major flight routes in the eastern PRC; new routes will link it to major cities in the PRC and abroad. Water transportation on the Ganjiang River is convenient; the river connects Nanchang port to the Yangtze River, and the possibility of developing large-scale pollution-free water transportation is great.

Nanchang will be divided into two areas: Changnan and Changbei, to consist of eight parts divided by rivers, lakes, hills, railways, and streets. Each part is to be relatively self-contained and independent while complementing other parts. The city's goal is to see GDP in 2000 increase by 3.5 times over that of 1980, and then again by 1.5 times by 2010.

The city's goals are to improve agriculture; boost commerce and trade; build up automobile manufacturing, machine building, and light industry; and promote the coordinated development of industry. By 2000, it is estimated that urbanization will be 50 percent, and by 2010, 60 percent.

STATE OF THE URBAN WATER SUPPLY

The city's urban water supply was first developed in 1936. At that time, the waterworks had a capacity of only 16,400 m³/day. In 1949, the yearly water supply was only 500,000 m³, the network of water supply pipelines was just 25 km long, and only 40,000 urban residents had running water. Since the founding of the PRC, tremendous changes have taken place. The city now has seven waterworks, with a total capacity of 1.03 million m³/day, 63 times that of 1949.

Water supply facilities have been gradually improved, and water-purifying technology is reasonable, reliable, and can be made locally. Water supply equipment, materials, and automatic control equipment are continuously upgraded, and are close to meeting UNESCO's Drinking Water Sanitary Standards. Water pipes (the biggest ones are 1.6 m in diameter) make up a network 946.35 km long, 37 times that of 1949. In 1998, the volume of running water reached 245.52 million m³/year, 540 times that of 1949. All urban residents have running water. The tremendous improvement in the city's water supply has raised the quality of life, promoted health, encouraged production and economic development, and laid the foundation for future progress.

Sources of Urban Water Supply

The Ganjiang River is the main source of the city's water. It is the biggest river in Jiangxi province and the second biggest tributary of the Yangtze River. It begins in Ganzhou City, Jiangxi province, where the Zhangjiang and Gongjiang Rivers join. The Ganjiang river is 827 km long, covering 83,000 km². It discharges close to 70 billion m³ of water per year, about 1.4 times more than the Yellow River.

The city's Environmental Protection Department and the Urban Water Supply Department have set up water quality monitoring stations and a conservation area for sources of drinking water. In recent years, the comprehensive quality index of water met the specifications of surface water environment quality standards. The quality of drinking water is considered good.

10-YEAR PLAN FOR URBAN WATER SUPPLY

The city's general urban development plan estimates that by 2010, the city center's total population (permanent and temporary residents) will be 1.82 million; if they consume 300 l/day, total consumption will reach 582,400 m³/day. By then, yearly industrial output value will be Y23.1 billion (excluding self-supplied water). If

average water consumption is 140 m³/Y10,000 everyday for 300 working days per year, total industrial demand for water will be 1.01 million m³/day. Demand from waterworks, public buildings, fire fighters, parks, and street sweepers, as well as water lost to leaks, make up 35 percent of the total, or 557,300 m³/day. In 2010, the city center's water consumption may reach 2.15 million m³/day. Water supply goals by 2010 include the following:

- Expand the Qingyun waterworks in the Changnan urban area from 400,000 to 600,000 m³/day, and scrap the now-polluted Jingshan and Dongjiao waterworks (with a total capacity of 60,000 m³/day).
- Build two waterworks (each with a capacity of 300,000 m³/day) south and north of Changnan.
- Expand and renovate Shuanggan waterworks in Changbei, and increase their capacity from 70,000 to 100,000 m³/day.
- Build new waterworks (with a total capacity of 400,000 m³/day) in Niuhan, Changbei.

Central Nanchang has a water supply delivery capacity of 1.03 million m³/day. By 2010, Changnan will have three waterworks (built or expanded) with a capacity of 740,000 m³/day, while Changbei's two waterworks will have a capacity of 430,000 m³/day. The city's total water supply capacity will be 1.17 million m³/day, reaching 2.2 million m³/day.

In addition to building new waterworks, 225 km of pipeline should be laid. As urban roads and residential areas are renovated, old pipelines that cannot meet water supply demand should also be refurbished at the same time, with an estimated 43 km replaced with new pipes. The investment is estimated at Y18.5 million. Two force pump stations will be installed separately in Changnan and Changbei. Total estimated investment for all waterworks construction is Y1.9 billion.

PROBLEMS OF URBAN WATER SUPPLY AND THEIR SOLUTIONS

As the Ganjiang River runs through the city, it is difficult to prevent it from being polluted. Large volumes of wastewater from the Chengbei industrial area and domestic sewage from the Qingshan Lake drainage pumping station are discharged into the river's lower reaches. As a result, it is difficult to position the planned Chengbei waterworks. It is therefore urgent to restrict the discharge of wastewater that does not meet environmental protection standards. Highly polluting enterprises should be restrained or closed down.

The drinking water source from the Ganjiang River (Nanchang section) should meet the second level of national surface water environment quality standards. The area 100 m above and 100 m below the water-taking position should be protected. Industrial wastewater, domestic sewage, and other waste residue and harmful materials should not be discharged into the river. All polluting activities around this part of the river should be forbidden.

Extraction of groundwater should be restricted. Some wells should be closed. Water in the city's underground aquifer is so scarce and so deep that it is not worth exploiting. Groundwater mainly comes from rainfall; it produces only 70,000 m³/day. The drilling of over 300 wells has resulted in overdrawing of water, lowering of groundwater level, and sinking in some places. The wells are no longer viable sources of urban water supply. Some residents illegally draw groundwater from deep wells. Management of groundwater should therefore be improved; some still-viable groundwater resources should be allotted for use by special trades, while the nonviable deep wells should be closed.

A large percentage of water supply facilities are old, some technology and equipment are backward, and pipe material is sub-standard, causing a high rate of breakage and leaking. Water quality is inconsistent. Management of water supply facilities is based only on experience, lacking scientific methods. Power and raw material consumption and operating costs are fairly high, while productivity per capita is low.

As sufficient water supply is the foundation of urban development, the municipal authorities should do the following:

- Keep abreast of technical developments and achieve more substantial results with less input.
- Give priority to the Ministry of Construction's Urban Water Supply Development Plan 2000.
- Improve the quality of running water and the reliability of water supply. Reduce power consumption and the cost of depuration and water leakage. Improve water treatment technology and subject it to scientific quality control management. Pipe and lining materials should be of higher quality. Pipe networks should be rationally distributed. Efficiency of pumps should be improved by using speed-governing devices and employing economical and rational management methods. Management of water supply metering should be stricter, and meter-reading charges rationalized. Pipes should be systematically checked for leaks, and damaged pipes replaced immediately.
- Close the technological gap between the PRC and the advanced countries by adopting the following: (i) a system for managing and monitoring water volume and water source quality; (ii) automated water quality monitoring devices; and (iii) water supply autocontrol devices to regulate water pressure in pipe networks. Investment in urban water supply development should be increased. However, now and for some time to come, profits from water supply enterprises are not and will not be enough; most funds will have to come from the issuance of State bonds and from bank loans, whose low interest rates favor infrastructure construction. Another way to raise funds is to invite foreign capital to participate in waterworks construction. However, in using foreign government and bank loans, we should compare the increase in project cost with the economic returns gained from using advanced equipment. Foreign equipment to be imported should be unavailable locally, and should be key

to promoting technological progress, reducing consumption and cost, and increasing economic returns.

As for pricing policy, the municipal authorities should first promote sustainable development, rationally utilize water resources, eliminate waste, and increase pollution control. Second, water supply enterprises should earn a certain level of profit, while taking into consideration what consumers are able to pay. Finally, the authorities should consider the existing water supply enterprises as well as the development of the whole water supply system. Running water is defined as a commodity in the Government's National Guidelines on Water Tariffs. The price of running water should include cost, fees, taxes, and profit. The rate of profit is fixed as follows: net profit rate is 8-10 percent, 6 percent if invested mainly by the government, and 12 percent if utilizing loans.

Water prices must be readjusted using a strictly applied schedule. The price bureau should call meetings with representatives of all types of consumers to ensure rational pricing. While water prices in Nanchang have been raised several times, they are still below the domestic average. The low prices maintained by some cities have limited further development of urban water supply. Water prices should be gradually readjusted in accordance with the National Guidelines on Water Tariffs.

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